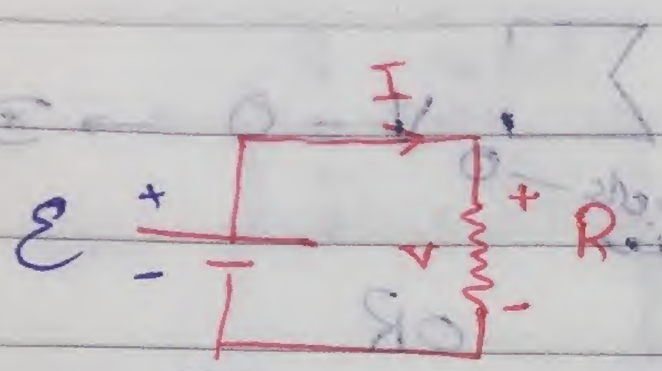
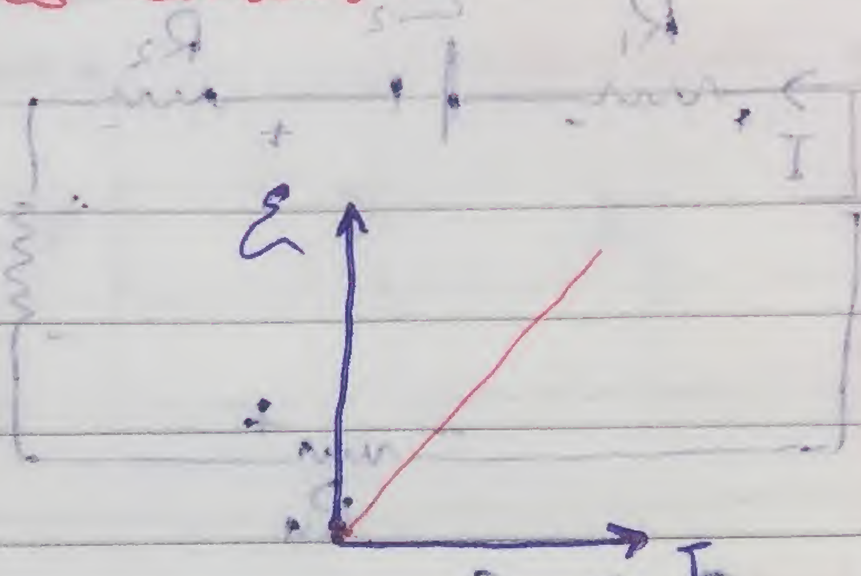
Subject. Lec 2

Date.

"Basic laws & series circuit."



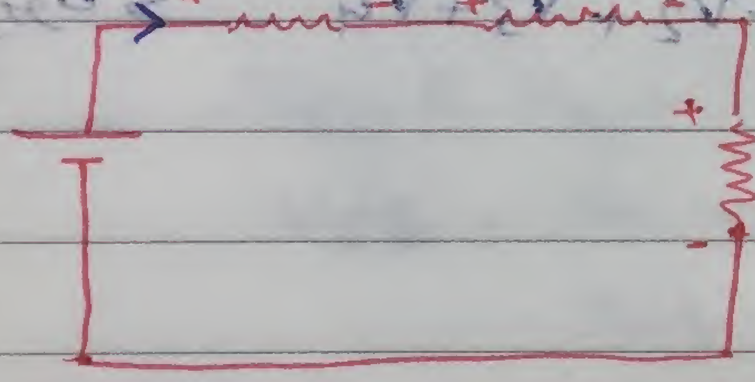


$$I = \frac{\mathcal{E}}{R}$$

$$P_R = + \mathcal{E}\, I$$

$$P_{\mathcal{E}} = - \mathcal{E}\, I$$

* حل لمسألة "معلوم اعرف المطلوب فقط"



$$R_t = R_1 + R_2 + R_3 \ldots$$

قانون تقسيم الجهد

$$V_1 = \frac{\mathcal{E}}{R_t} R_1$$

$$V_2 = \frac{\mathcal{E}}{R_t} R_2$$

$$V_x = \frac{\mathcal{E}}{R_t} R_x$$

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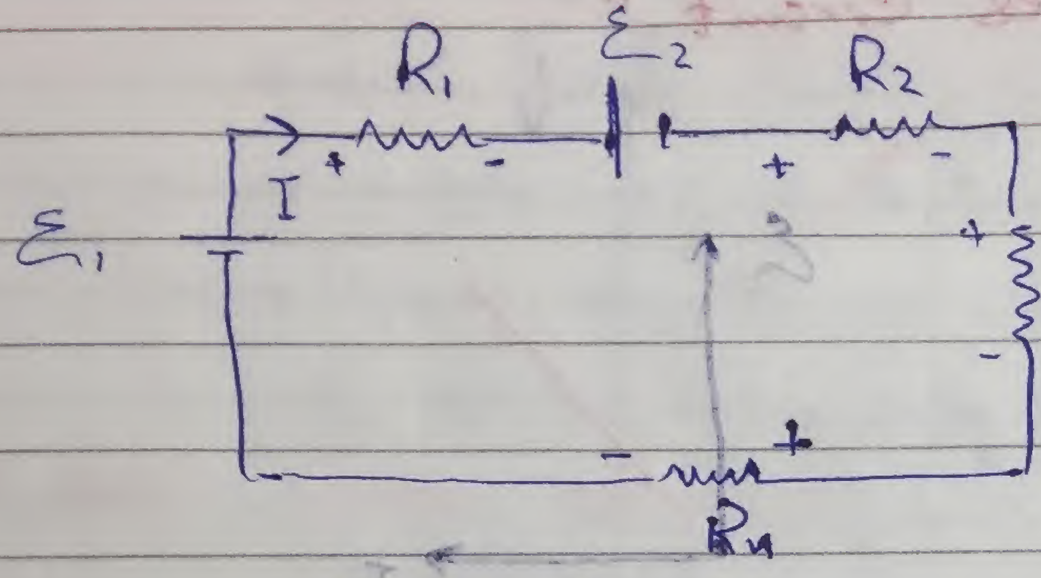
* Kirchhoff voltage rule :-



قانون كيرشوف

$\sum V = 0 \rightarrow$ (*)

على حلقة مغلقة

OR

$\sum V_{rise} = \sum_{drop} \rightarrow$ (**)

مجموع البطاريات — على طول موجب — مجموع العناصر

$\varepsilon_1 > \varepsilon_2$

(*) $\varepsilon_1 - V_1 - V_2 - V_3 - \varepsilon_2 - V_4 = 0$

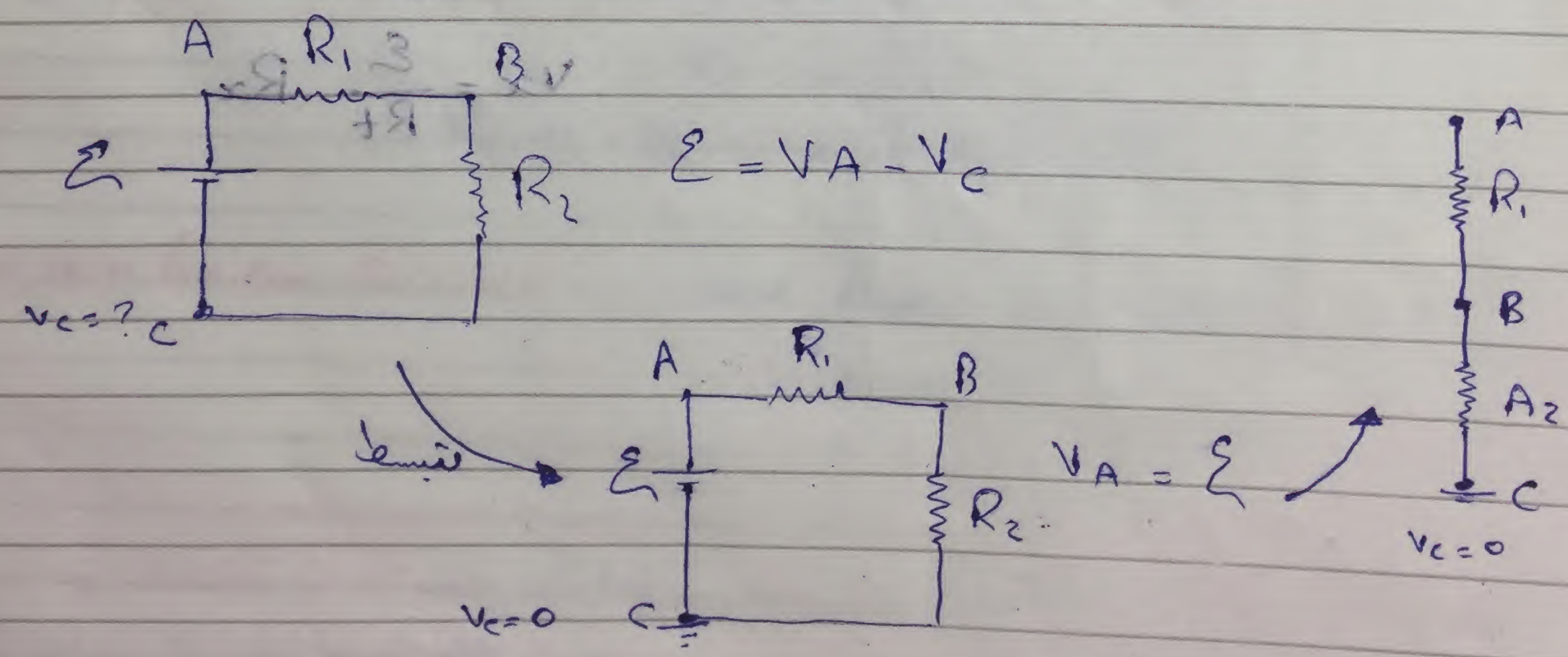
$\varepsilon_1 - \varepsilon_2 = V_1 + V_2 + V_3 + V_4 \longrightarrow$ كيرشوف

(**) $\varepsilon_1 - \varepsilon_2 = V_1 + V_2 + V_3 + V_4 \longrightarrow$ كيرشوف

$P_1 = I^2 R_1$

$P_{supply} = -\varepsilon_1 I$

* voltage Source and ground $\neq V = 0$:



Subject.

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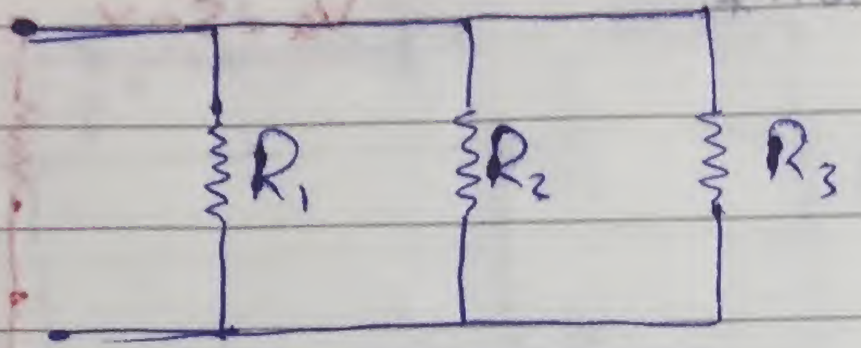
* if it's parallel-

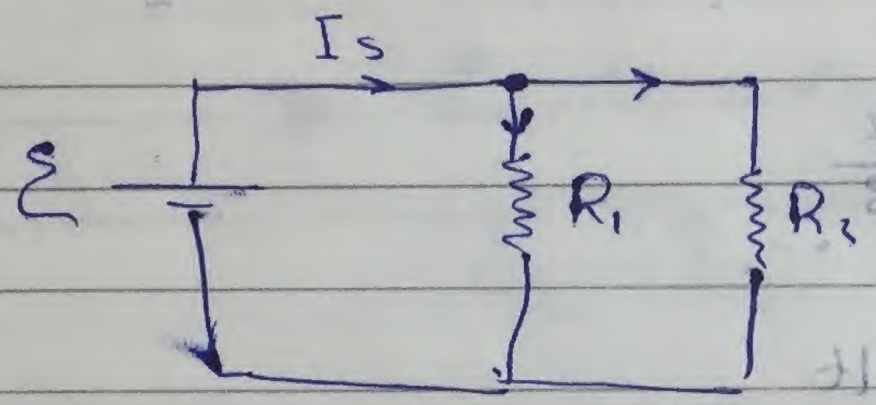


$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} \dots$$

$$G_t = G_1 + G_2 + \dots$$

R = Resistance

G = conductors.

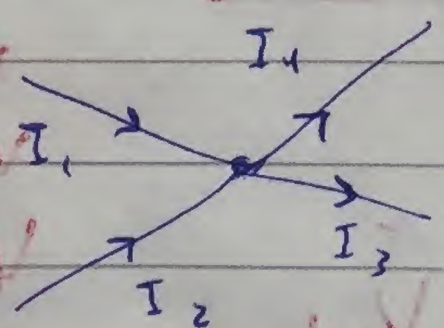


$$I_1 = \frac{I_s R_2}{R_1 + R_2}$$

$$I_x = \frac{I_s R_t}{R_x}$$

$$I_1 = \frac{\mathcal{E}}{R_1} = \frac{I_s R_b}{R_1}$$

* Kirchhoff's current Law:

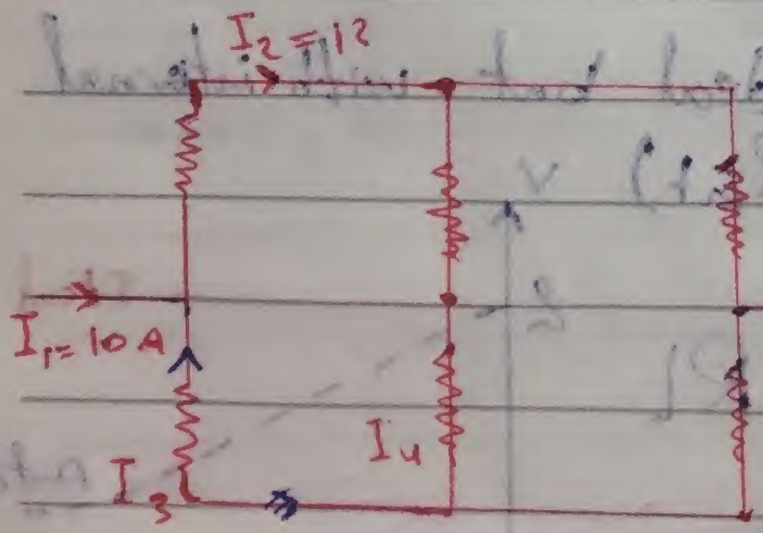


$$I_1 + I_2 = I_3 + I_4$$

$$\sum_0 I_n = 0$$

$$\boxed{I_1 + I_2 - I_3 - I_4 = 0}$$

ex:



Sol: $I_2 > I_1 \quad \therefore I_3 \uparrow = 2A$

$I_4 = I_2 - I_s = 12 - 8 = 4 \downarrow$

$I_6 = 2\ A \rightarrow$

$I_7 = I_1 = 8\ A \rightarrow$

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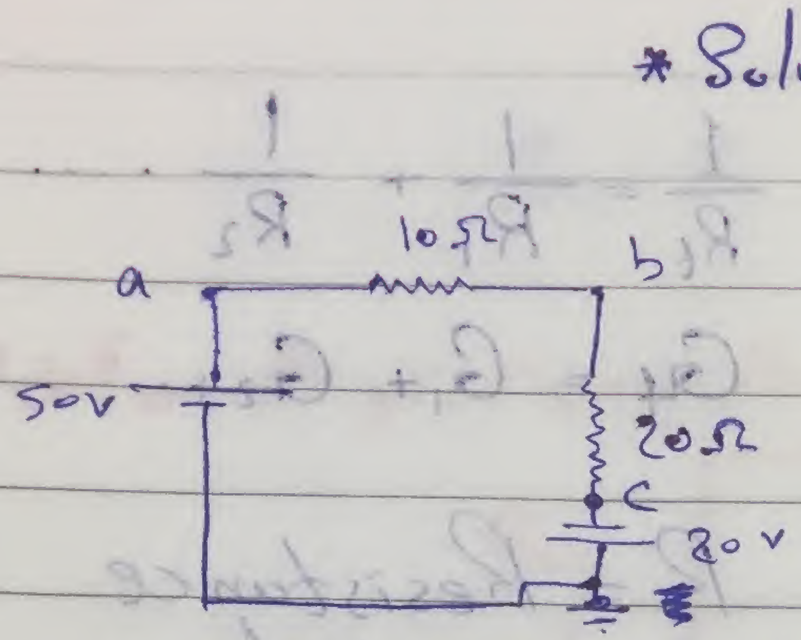
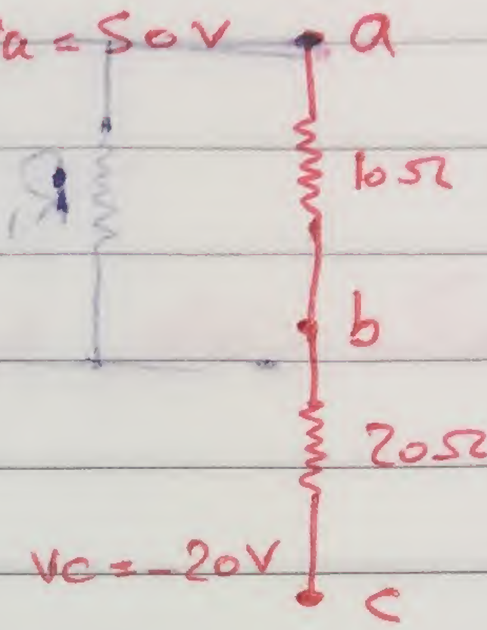
ex: Solve the circuit: find V_{ab}, V_{ac}, V_{cb}:-

* Solution *





$50 + (-20) = I(10 + 20)$

$\mathcal{E}_1 + \mathcal{E}_2 = I(R_1 + R_2)$

$I = \frac{70}{30} = \frac{7}{3}$

$V_{ab} = \frac{7}{3} \times 10$ volt

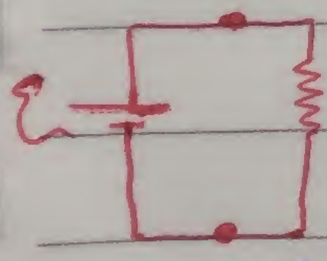
$V_{ac} = V_a - V_c = 50 - (-20) = 70$ volt

$V_{cb} = V_c - V_b = -20 - ?$

$\therefore V_{cb} = -I \times 20 = -(\frac{7}{3} \times 20)$ volt

* Internal resistance of voltage Source :-

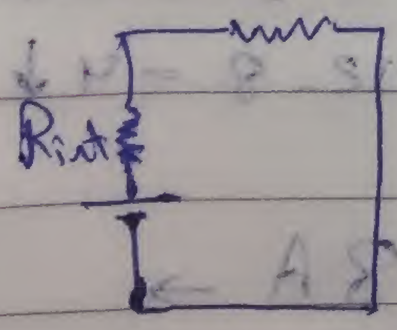
• Ideal voltage Source:



$\mathcal{E} = V_L$ & $\mathcal{E} = V_{nL}$

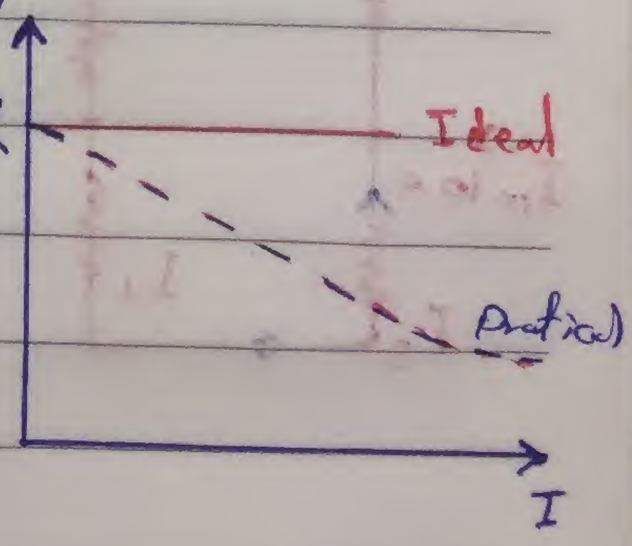
* note *
$V_L = V_{loads}$
$V_{nL} = V_{no\ loads}$

• pratical voltage Source: the same of Ideal but with internal Resistance (R_{int})



$R_{int} = \frac{\mathcal{E} - V_L}{I_L} = \frac{V_{nL}}{I_L} - R_L$

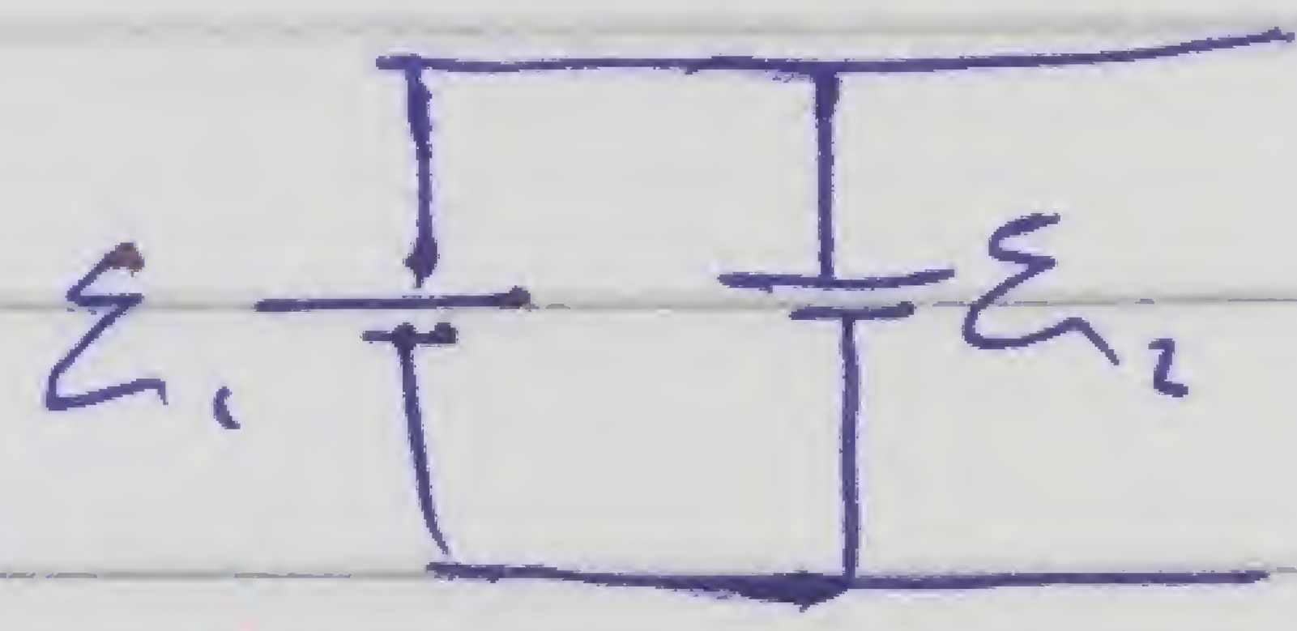
$P_L = P_{\mathcal{E}} - P_{loss}$



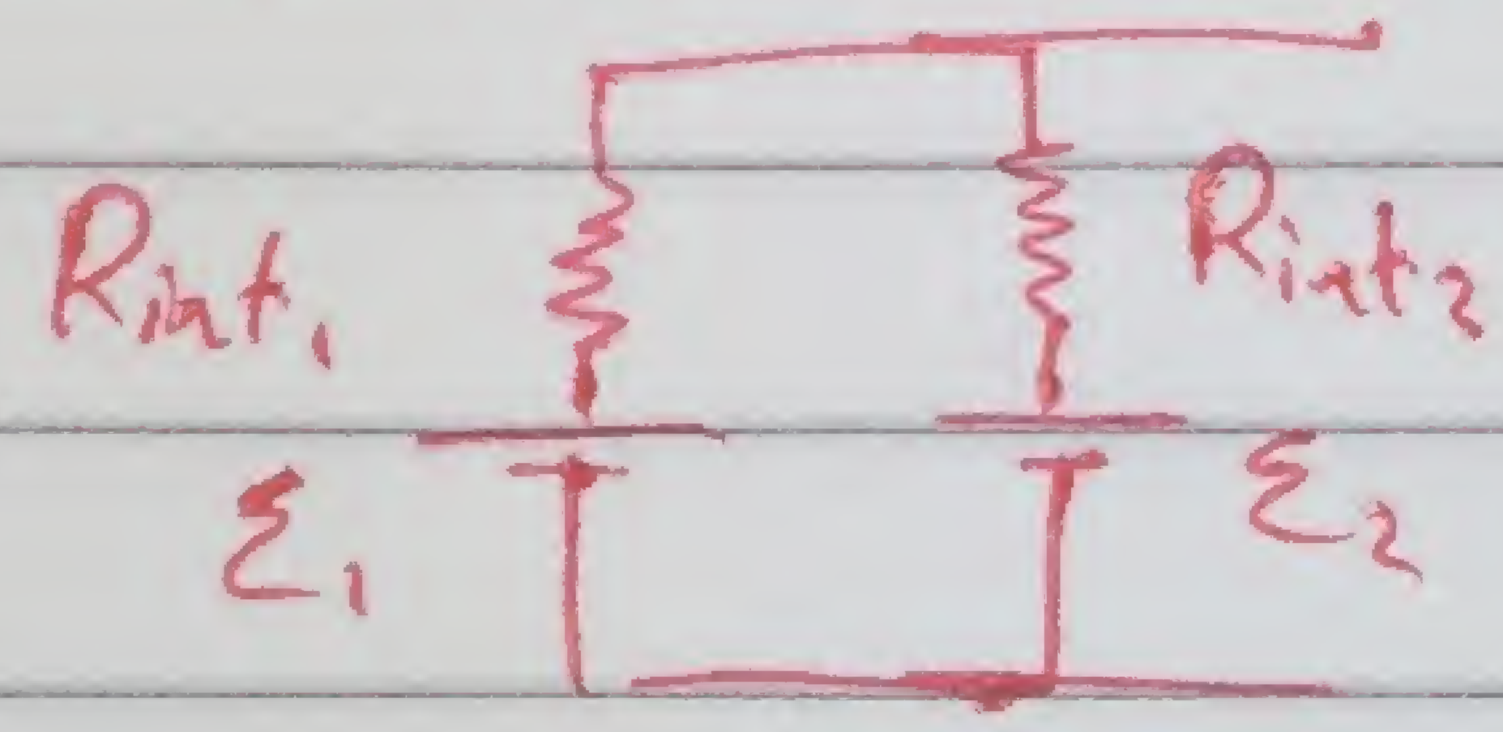
Subject. Date.

* لو البطاريتان على التوازي Ideal

$\varepsilon_1 = \varepsilon_2$



وممكن نوصلهم لو هي مش Practical بس لازم نقيس تحمل البطارية.



نهاية المحاضرة ③